

POSSIBILITIES OF SELF-SUSTENANCE OF FREE RANGING RHESUS OF TUGHLAQABAD¹

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(With a text-figure)

INTRODUCTION

Two decades ago, the estimated number of rhesus macaques in the wild was around 4,000,000 but, according to the latest estimate it has been reduced to only about 140,000 individuals. The reasons for the decline of free-ranging Rhesus population could be (1) change in the habitat, (2) no scope of expansion of habitat, (3) lack of abundance of food and protection, and (4) trapping.

During a long term study of free-ranging Rhesus population of Tughlaqabad, it was observed that complete protection, no trapping, abundance of food, favourable adaptation to the environment and habitat which has scope for expansion made the self sustenance of an ever growing population possible. At Tughlaqabad, a positive correlation was witnessed in the population growth and the potentialities of the habitat. The data provides important guidelines for conservation and restoration of primate population and an encouraging example of primate population improvement in a generally discouraging worldwide situation.

STUDY AREA

Tughlaqabad is an ancient city site and 14th Century fort situated on the southern edge of New Delhi at 30° 25' N latitude and 78° 76' E longitude. The home range of the

rhesus monkey groups under study extends throughout the fort and surrounding areas, covering approximately 5 sq. km. (2.5 × 2.0 km.). The fort was built of massive stones on a rocky hill with the outer ramparts integrated into the hill, so that the entire structure rises 50-90 feet above the surrounding plain (Fig. 1). The outer walls of the fort form a polygon with a circumference of nearly 5 km. The flat and fertile area surrounding the fort contains cropland, pasture, two forested areas.

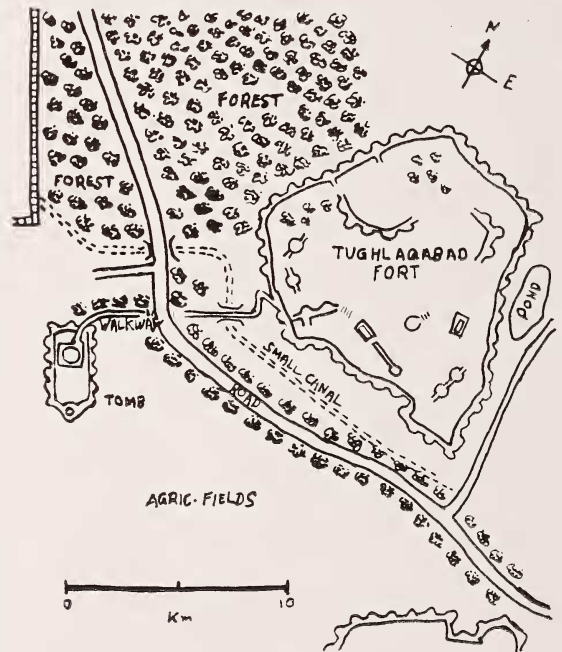


Fig. 1. Home range of Tughlaqabad monkeys showing Tughlaqabad fort, tomb, forest, plantations, agricultural fields, canal, hills, and surrounding roads.

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and encroaching suburban development. A road runs through the southern part of the area; trees lining the area are used by the rhesus monkeys for sleeping at night and resting during the day. Across the road, to the south of the fort, is the restored tomb of Tughlaq Shah, who died in 1325 A.D. The entire area, both the fort and the tomb, has considerable historical significance and has been described by Williams (1962) "The vast size, strength, and visible solidity on the whole give to Tughlaqabad an air of stern and massive grandeur."

The fort constitutes one-fourth of the total area, two forest plantations occupy another one-fourth, and the surrounding open areas of cultivation and pasture constitute the remaining half (Fig. 1).

Tughlaqabad has a subtropical climate with marked seasonal changes. During the months of May and June, daytime temperatures often reach 40° to 45°C; in December and January temperatures fall to 7° to 9°C. Monsoon occurs from the end of June or early July until mid-September, with an annual average of 567 mm. of rain. Winter and spring rains occur sporadically and are usually light.

The natural vegetation inside the fort is xerophytic, generally grasses and arid forbs and shrubs. Outside the fort, vegetation is more mesophytic, and better ground water supports trees and crops, primarily wheat and pulses. The main trees present are Indian jujube (*Zizyphus jujuba*), neem or margosa (*Azadirachta indica*), sheesham or sissoo (*Dalbergia sissoo*), oak (*Quercus incana*), acacia (*Acacia arabica*), pipal (*Ficus religiosa*) and date palm (*Phoenix dactylifera*). Other than people, the dominant fauna includes rhesus monkeys, cattle, donkeys, goats, dogs, jackals, mongoose, lizards, and a great variety of birds, both migratory and resident. Peafowl,

partridges, pigeons, crows, sparrows, vultures, mynas, and kites are common.

FIELD METHODS

The present study started in 1980 to study selected behavioural aspects of Rhesus of the area, with an emphasis on population dynamics. Related counts (Malik, Seth, Southwick 1984) were made in (1) March before the birth season, (2) July and August immediately after the birth season, (3) October and November following monsoon and just prior to winter. This method provided data on the minimum March, maximum July and August population of the year and a transitional period from monsoon to winter (October and November). A record of births, deaths, disappearances, accidents and injuries was also kept. Hence when the largest group of the area increased its home range and then changed its core area, it was immediately noted, and thereafter a constant watch was kept to observe the movements of this particular group. Observations have been made from March, 1980 to January, 1985.

RESULTS

Diversity of habitat:

The Tughlaqabad area provides the monkeys with a wide range of food, both natural and that offered by humans. Food is consistently provided by humans, in an almost ritualistic way. On days when humans do not provide enough food, the monkeys have the natural vegetation and crops grown by humans to fall back on. The monkeys need never go hungry and, as a result, they are healthy and well-fed.

The fact that the monkeys spend 80% of their waking hours on the ground, provides proof of the suitability of the area as well as of the positive relationship that exists between

the Rhesus monkeys and humans. In stormy weather, when the banging of the branches and the howling of the wind heighten their sense of insecurity, the monkeys take refuge in the thick, crevice-ridden walls of the fort. When attacked by other animals (dogs, cattle, etc.), they seek sanctuary in nearby trees. The open spaces in the fort provide them with enough space to sun-bathe during the winter. The people of the area have always treated the monkeys with reverence, so that they are not harassed; on the contrary, they are provided with protection.

No trapping was done during the course of this study, though, as I learned from local residents, trapping went on until 1978. The monkey population fell to quite a low level and due to these circumstances, the monkeys became quite aggressive towards human beings. Now there is peaceful co-existence between man and Rhesus at Tughlaqabad.

Elasticity of habitat:

From March, 1980 to November, 1984 the home range of rhesus monkey groups under study extended throughout the fort and surrounding areas covering approximately 5 sq. km.

In 1984, after the breeding (May-July) but before the onset of winter, group A extended its home range. Adjoining the southern end of their initial home range, is situated a walled Air Force enclosure. This establishment — a completely restricted area — was included in the home range (Fig. 1).

Group A first started frequenting it, then used it for sleeping and resting, and then most of their time was spent inside this Air Force compound which is now their core area. The canteen inside this area seems to meet a major portion of their diet. At times they come out to feed at the roadside but it is never quite certain that the whole group would converge

upon the visitor as they did earlier. The rhesus have been seen on the northern wall of this compound and, at times, on the eastern and western walls but never on the southern side. The extent of utilisation of this space is not exactly known, but a vague estimate is that the extended home range of group A is 1 km².

The vegetation of the Air Force area is similar to that on the outside, but cultivation is minimal, being limited to kitchen gardens which would be zealously guarded against raids by the rhesus. Trees visible from the outside are sheesham or Sissoo (*Dalbergia sissoo*) and neem or margosa (*Azadirachta indica*). It would, however, be safe to presume that there would be other varieties of trees, some of which may even be bearing fruits consumed by human beings. The fauna would slightly vary from the outside as dogs, goats, donkeys, buffaloes and cattle would not be allowed inside. As for smaller animals like mongoose, lizards, and snakes such restrictions would be difficult to impose. The variety of birds would also be similar to the outside.

The habitat provides a vast scope for the further expansion of the home range of rhesus of the area (Fig. 1). On the southeast side of their territory is 'Adilabad'. This is another fort but considerably smaller than the one presently used by the rhesus, but providing similar facilities for them. To date the monkeys have only visited the boundaries of this fort for water, but may be in future, if need be, they might start spending more of their time there. Further south are rocky hills with xerophytic vegetation with little or no predators. Towards the north, beyond the fort are patches of forest with a busy road running along them, which could be an excellent source of food for them. Towards the east, beyond the home range are more forests, which can provide good cover if the need arises. Rhesus have so far not visited these areas.

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Population growth and habitat:

In five years the rhesus population at Tughlaqabad has increased by 119.38%, from 160 monkeys in July, 1980 to 351 in July, 1984 — an annual average increase of 22.70%. It is felt that this tremendous increase is due to the habitat, which provides protection, abundance of food and water, good cover and has scope for expansion. Due to the right combination of ecological and behavioural factors, rhesus not only sustained themselves but the population more than doubled in five years.

In 1980, the number of Rhesus per sq. kilometre of home range was 32. With the increase of population every year, the number per sq. km. kept increasing (Table 1). The

TABLE 1

NUMBER OF RHESUS PER SQUARE KILOMETRE OF HOME RANGE JULY 1980-NOV. 1984

Date of census	Total Rhesus population of the area	Home Range (Sq. km.)	No. of Rhesus/Sq. km.
July 1980	160	5	32
July 1981	201	5	40.2
July 1982	244	5	48.8
July 1983	286	5	57.2
July 1984	351	5	70.2
Nov. 1984	351	6	57.4

maximum number was in July, 1984, viz. 70.2 Rhesus per sq. km. of the home range. This congestion probably led to the expansion of their initial home range, as a result of which, in November, 1984 the number came down to 57.4 monkeys per sq. km. of the area. This was almost the same as in 1983 (57.2 Rhesus per sq. km. of the area). It seems that the maximum number of Rhesus which the initial home range could sustain, is around 286.

Splitting and habitat:

The social behaviour interacting with environmental parameters determines the number of rhesus that may exist in a group. At the beginning of this study in January, 1980, the Tughlaqabad rhesus population consisted of two groups; A of 92 monkeys, and B of 28. By the summer of 1983, the population had grown to 286 monkeys, and the number of groups had increased to five (A, B, C, D and E). Groups C, D and E were splinter groups of A, which remained the largest groups in the area. None of the members of group B joined either C, D or E nor did groups C and D contribute to group E. Group B remained an intact group throughout the study period.

The first split of group A took place in December, 1980, towards the end of the rainy season. The group size was 123 individuals, and a sub-group of 21 separated to become group C. Fifteen months later, in March, 1982, at the beginning of the birth season, the total size of group A was 120, and the second split occurred when 11 individuals left to form group D. Group A was reduced to 109 individuals but, after the birth seasons of 1982 in June, it numbered 133. The third split occurred in the spring of 1983 when group A numbered 137 individuals, of which 29 left to form group E. By July, 1983, group A had been restored to a level of 123 through births and, by July, 1984 its number went up to 155 but no split took place. Table 2 shows the effect of expansion of home range on splitting. In the initial home range, group A apparently could sustain only a certain number of individuals (approximately 120), and still maintain co-ordinated activities as a social unit. Once the number exceeded this limit, a splinter group was formed. The reason for no split in 1984 (when the number was 155) could be the increased home range of group A. In future years a record of popula-

TABLE 2

EFFECTS OF EXPANSION OF HOME RANGE ON SPLITS
IN GROUP A.

Date of Census	Home range (sq. km.)	No. of Rhesus of Parent Group	Formation of splintered Ranks from Group A
July 1980	5	123	—
July 1981	5	154	123— (A) 31— (C)
July 1982	5	148	133— (A) 15— (D)
July 1983	5	152	123— (A) 29— (E)
July 1984	5	155	—
Nov. 1984	6	155	—

tion splits of groups can reveal the optimum number of Rhesus which can be sustained in group A in this expanded home range.

There was a clear dominance pattern in intergroup encounters. Group A still remained the most powerful, as well as the largest group, at the termination of this study in January, 1985, as it had been since January, 1980.

DISCUSSION

It has been proposed that, in northern India, one reason for the decline in rhesus population could be the changing beliefs of the rural people who no longer consider them sacred (Seth & Seth 1983). But at Tughlaqabad, people consider them sacred. They are given protection against undue harassment. One instance is of a lorry driver who had accidentally run over a monkey and was given a severe beating. This is perhaps the one instance which would confirm beyond all doubts that the beliefs of the people have not changed. It is felt that it is not the beliefs that are changing but the monetary condition of the people who find it more and more difficult to be generous to the rhesus monkeys. It is

still true that humans in large number and from great distances come to feed them.

Another reason could be the changing habitat due to deforestation, overgrazing, commercial development and spread of cities (Seth & Seth 1983). The changes in habitat were also observed at Tughlaqabad. For example, in 1982 a shooting range was constructed on the southern side of the monkeys' territory which resulted in increased human activity. Secondly, the noise of the firing added to the monkeys' sense of insecurity and fear, as a result of which they would go to the fort. The road which runs through the area has an ever increasing traffic. With the increase in tourists and other activities, related facilities have also started cropping up, for instance, tea stalls and vendors. But it was observed that even after the construction of the shooting ranges, the monkeys were still using the same sleeping quarters that they were using prior to construction and they did not decline in numbers in this area. As the monkeys obtain a major portion of their diet from human beings, a preference for a location secluded from human interference [J. E. Fa (1983)] would not be applicable here. Southwick (1967) and Alexander & Roth (1971) observed that aggression in captive groups of rhesus and Japanese macaques respectively increased under crowded conditions. Southwick *et al.* (1965) reported that adult males attacked other members of a group, including infants, at feeding time. R. P. Mukherjee (1976) observed that males of the Mahabali temple attacked group members during feeding and non-feeding times, and even when unprovoked. This was the result of the population having increased, with no scope for expansion of their territory. The aggression may have further increased the mortality.

Brennan and Else (1984), in their study of De Brazza monkeys (*Cercopithecus neglectus*)

suggested that the remnant population (just over 100 in Kenya) be translocated as the first step in trying to save them. It is felt that if the present trend of urbanisation in the area continues, the present rate of growth of this population would fall unless they are translocated. A favourable point to be noted here would be the availability of a suitable locality in the same habitat.

I propose several possible reasons for the high population growth and low mortality rates of the Tughlaqabad rhesus. First, the population in this particular locality has been rigorously protected by the beliefs and traditions of local people. Prior to 1978, the protection by local people could not be total because the people remained primarily in their fields and along the roadside, and were not always present when the monkeys went into the forest and fort areas. Beginning in 1978, however, and more or less coincident with the rhesus export ban in April, 1978, the government of India began a programme to attract more tourists to Tughlaqabad, and full-time chowkidars or guards were assigned to the Tughlaqabad fort. These chowkidars provided virtually total protection for the monkeys by preventing anyone from molesting them.

Secondly, there are no predators in the area, except dogs, and the area is so rich in trees, walls and crevices where dogs cannot reach, the monkeys can easily escape from attacks by dogs.

Food resources are abundant. In addition to many natural foods provided by the vegetation of the area, of which more than 43 species were consumed, food provided by humans is so abundant on some days that much of it goes waste. The monkeys thus have three sources of food—natural vegetation, surrounding cropland, and extensive provision-

ing by people along the roadside and entrances to the fort and tomb.

The home range of the monkeys include two areas of forest plantations, in which good food trees (such as neem, jujube, sheesham, and peepal), are now beginning to reach a stage of growth and size of real benefit to rhesus monkeys. I have the impression that the successional growth of the forest reached a threshold point in the late 1970's and now provides significantly better cover and food for the monkeys. This has considerably enhanced their habitat.

I believe the groups are well adapted to this area. They, therefore, require no period of adaptation or adjustment to capitalize on the new benefits of extra protection and expandable habitat.

I believe that the low level of aggressive behaviour observed indicates both the favourable expandable habitat of the monkeys and their successful adaptation to it. Their peaceful behaviour could certainly be a reason for low mortality.

An additional reason for the outstanding population growth is that the animals were healthy and no obvious diseases were apparent. I did not see any coughing, runny noses, and diarrhoeal symptoms which often appear in other rhesus groups, especially those in and around towns and temples. Finally, at Tughlaqabad it was observed that an increase in the home range makes possible the self sustenance of an ever growing population.

The most dominant group of the area made a pre-emptive move to check any possible decline in their population by first expanding its home range and then changing its core area. Thus a positive correlation was witnessed in the population growth and the potentialities of the habitat at Tughlaqabad.

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